J. D. Dale,

Stone Drill.

No. 52,827. Patented Feb. 27, 1866.

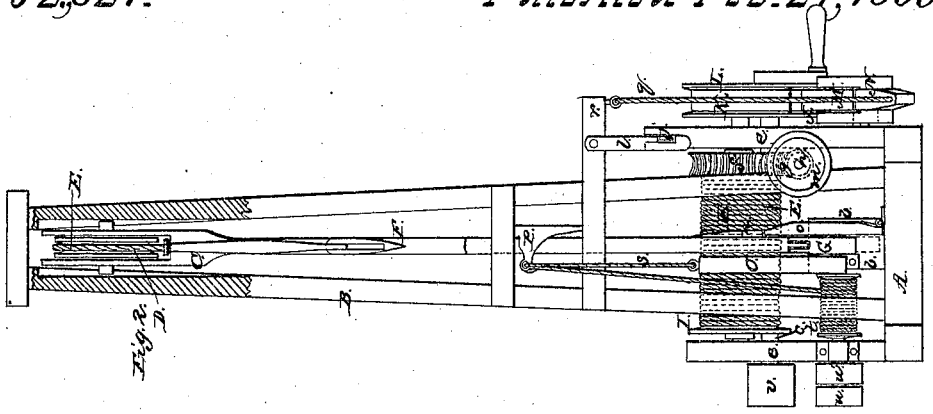

Fig. 2.

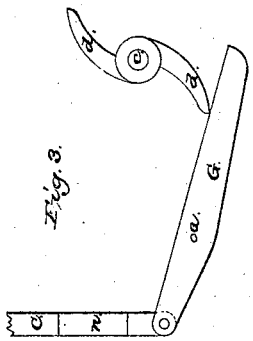

Fig. 3.

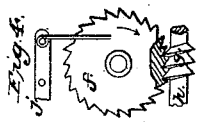

Fig. 4.

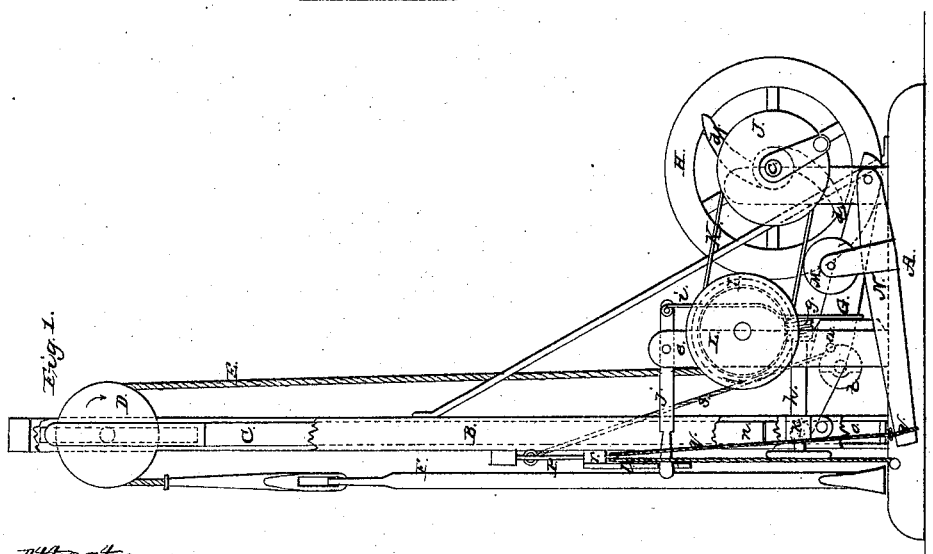

Fig. 1.

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UNITED STATES PATENT OFFICE.

JOHN D. DALE, OF ROCHESTER, NEW YORK.

IMPROVED ROCK-DRILL.

Specification forming part of Letters Patent No. **52,827**, dated February 27, 1866; antedated February 16, 1866.

To all whom it may concern:

Be it known that I, JOHN D. DALE, of Rochester, in the county of Monroe and State of New York, have invented a new and improved Machine for Boring Rocks, &c.; and I do hereby declare that the following is a full, clear, and exact description of the same, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a side elevation of this invention, partly in section. Fig. 2 is a sectional front elevation of the same. Fig. 3 is a detached side elevation of the mechanism for operating the drill. Fig. 4 is a detached view of the ratchet-worm.

Similar letters of reference in all the figures indicate corresponding parts.

This invention consists, first, in arranging the pulley which forms the guide and support of the drill-rope on a slide, to which a rising-and-falling motion is imparted by the action of cams on the driving-shaft, in combination with a windlass, on which the drill-rope winds in such a manner that only one pulley intervenes between the windlass and drill, and thereby the wear and tear of the drill-rope is reduced to its minimum, and at the same time, by comparatively short or low cams, a high stroke of the drill is effected; second, in the application of a hinged or adjustable prop, in combination with the rising-and-falling slide, and with a nose attached thereto in such a manner that the operator, without leaving his stand or without stopping the motion of the mechanism, can stop the rising-and-falling motion of the slide and drill simply by turning the prop to such a position that the same catches under the nose of the slide; third, in the use of a peculiar ratchet-worm and worm-wheel, in combination with the reel on which the drill-rope is wound, and with a hand-lever which serves to govern the position of the ratchet-worm in relation to the worm-wheel in such a manner that by the peculiar formation of its teeth said ratchet-worm serves the double purpose of a worm and of a ratchet, allowing the worm-wheel to slide over its teeth in one direction, while it gears in the worm-wheel on the end of the reel and produces the desired feed motion when turned in the requisite direction; fourth, in the application of a lever with tightening-pulley, in combination with a rope attached to the front part of the frame, and with a belt extending from a pulley on the driving-shaft over a pulley on the shaft of the windlass or reel in such a manner that by pulling the rope the operator is enabled to cause the reel to revolve in the proper direction to take up the rope and to raise the drill, and that the operator has full control over every part of the machine without leaving his stand; fifth, in the application of a crane, in combination with the cross-bars of the derrick which supports the boring-rope, and arranged in such a position that by turning said crane out the sand-pump can be readily lowered in and raised from the well, and when not used said crane can be readily turned out of the way and brought in such a position in which it does not interfere with the boring operation.

A represents a frame or platform, made of wood or any other suitable material, from which rises the derrick B, which is composed of two beams placed in a slightly-inclined position and connected by cross-bars, so as to steady them in this position. Said derrick forms the guide for a slide, C, the upper end of which is forked and forms the bearing for the axle of a pulley, D. Over this pulley runs the rope E, that supports the drill-rod F.

The upper end of the slide C is guided in suitable ways, which may consist simply of grooves capable of receiving the ends of the axle of the pulley D, or which may be formed in any other suitable manner, and its lower end is hinged to a lever, G, which has its fulcrum on a pivot, *a*, secured in standards *b*, rising from the platform A. The inner end of said lever extends back under the driving-shaft *e*, which is furnished with two (more or less) cams or tappets, *d*, and on which is mounted a fly-wheel, H, to equalize the motion. By the weight of the slide and of the drill-rod the outer end of the lever G is depressed, and consequently its inner end raised toward the driving-shaft, and as this shaft revolves the tappets *d* are alternately brought in contact with said inner end, and by these means the slide C, with the drill-rod and drill, are raised and dropped at the proper intervals. It must be remarked, however, that the tappets or cams *d*, instead of acting on the lever

G, might be made to act directly on the slide C to raise and drop the same at the proper intervals, and I do not wish to confine myself, therefore, to the precise arrangement shown in the drawings, but reserve the right to change the same as may hereafter appear desirable.

The slide C is provided with a nose, *n*, projecting from one of its sides, and a prop, *o*, is provided, which is hinged to the platform A in such a position that it can be turned under the nose *n* when the slide has reached its highest point. By doing so the slide is retained in that position, and the operation of the drill stops without interrupting the motion of the driving-shaft.

The drill-rope E extends from the windlass or reel I, on which it is wound, over the pulley D in the top of the slide C, and if said slide rises one inch the drill is raised two inches, for in raising the pulley one inch the drill would be raised one inch if the rope were firmly secured to the same, and at the same time the distance of the pulley from the reel increases one inch, and the pulley is caused to revolve in the direction of the arrow marked on it in Fig. 1, thus raising the drill a second inch. By this arrangement I am enabled to produce the requisite stroke of the drill with comparatively short tappets or low cams, and the machine operates with a comparatively small expenditure of power.

The axle of the reel I has its bearings in standards *e*, which rise from the platform A, and it bears a worm-wheel, *f*; and a ratchet-worm, *g*, mounted on the inner end of an arbor, *h*, is made to gear in said worm-wheel and to impart to the reel the requisite motion for feeding off the rope as the work progresses.

The teeth of the ratchet-worm are so formed that they allow the worm-wheel and the reel to slide over them when turning in the direction marked thereon in Fig. 4; but by turning the worm in the proper direction the desired feed motion can be produced.

The arbor *h* has its bearings at its inner end in a slide, *i*, which is connected to a hand-lever, *j*, and at its other end in a box, *k*, which is secured to one of the uprights of the derrick B by means of one screw, so that it is free to turn up and down.

By depressing the slide *i* the worm can be thrown out of gear with the worm-wheel, and the slide is operated by the hand-lever *j*, the outer end or handle of which is in such a position that the operator can conveniently reach it without leaving his stand in front of the machine. In practice this handle will be made heavy enough to keep the worm in gear.

When it is desired to retain the worm in gear with the worm-wheel, the outer end of the lever *j* is made to catch in a notched bar, *l*, which is pivoted to an arm, *r*, extending from the derrick. A hand-wheel, *m*, mounted on the outer end of the arbor *h*, serves to produce the desired feed motion, and this hand-wheel is in such a position that it can be conveniently reached by the operator from his stand in front of the machine.

In order to raise the drill-rod with ease and facility, I have mounted on the driving-shaft a pulley, J, and a belt, K, extends from this pulley over a pulley, L, on the end of the shaft of the windlass. While the drilling operation proceeds the belt K is slack, so that it slides on the pulley J and produces no motion of the windlass; but whenever it may be desired a tightening-pulley, M, can be raised and the belt tightened, so that the windlass is caused to revolve in the proper direction to take up the rope.

The tightening-pulley M has its bearings on an axle, *p*, which is secured in a lever, N. The rear end of this lever is pivoted to one of the standards which form the bearings for the driving-shaft, and its front end is suspended from a rope, *q*, which extends through an eye or sheave in the arm *r*, extending from the derrick, as clearly shown in Fig. 2 of the drawings. By pulling the loose end of this rope the operator is enabled to raise the tightening-pulley, and to cause the same to bear on the belt K with the requisite force to prevent its slipping on the pulleys J L.

Before the drill is raised the motion of the slide C will be stopped by turning the prop *o* under the nose *n* before the operation of raising the drill commences.

The sand-pump O, which serves to raise the borings from the bottom of the hole, is suspended from a separate rope, *s*, which winds on a small windlass, *t*. On the axle of this windlass are mounted two pulleys, *u u'*, one fast and the other loose, and a belt extending from a pulley, *v*, on the driving-shaft over said pulleys *u u'* serves to impart to the windlass *t* the desired motion—that is to say, if said belt runs on the fast pulley *u* the sand-pump O is raised, and when the belt runs over the loose pulley the sand-pump can be lowered.

It will be noticed that in this machine all the parts are so arranged that the operator has control over the same without leaving his stand, and much time is saved in operating the drill.

The rope of the sand-pump O is suspended from the crane P, which turns on suitable gudgeons in the cross-bars of the derrick which supports boring-rope. By turning this crane out the sand-pump is brought over the center of the well-hole, and its operation is thereby considerably facilitated.

What I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of the slide C, pulley D, rope E, and lever N in the manner and for the purpose described.

2. The prop *o*, applied, in combination with the nose *n*, on the side of the rising-and-falling slide C, constructed and operating substantially as and for the purpose described.

3. The ratchet-worm *g*, mounted on a shaft, *h*, which turns up and down, in combination

with a worm-wheel, *f*, mounted on the shaft of the reel I, and with a hand-lever, *j*, or its equivalent, constructed and operating substantially as and for the purpose specified.

4. The tightening-pulley M and hinged lever N, applied, in combination with the rope *q* and with the belt K, running on the pulleys J L, substantially in the manner and for the purpose set forth.

5. The application of a crane, P, in combination with the cross-bars of the derrick which supports the boring-rope, substantially as and for the purpose set forth.

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Witnesses:
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